



Unmanned Systems Update SPAWAR Systems Center Pacific

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Introduction

▼ Unmanned Systems Branch

- Provides robotics R&D for all Armed Services and other DoD agencies
- 45 civilian scientists and engineers
- Over 30 current projects

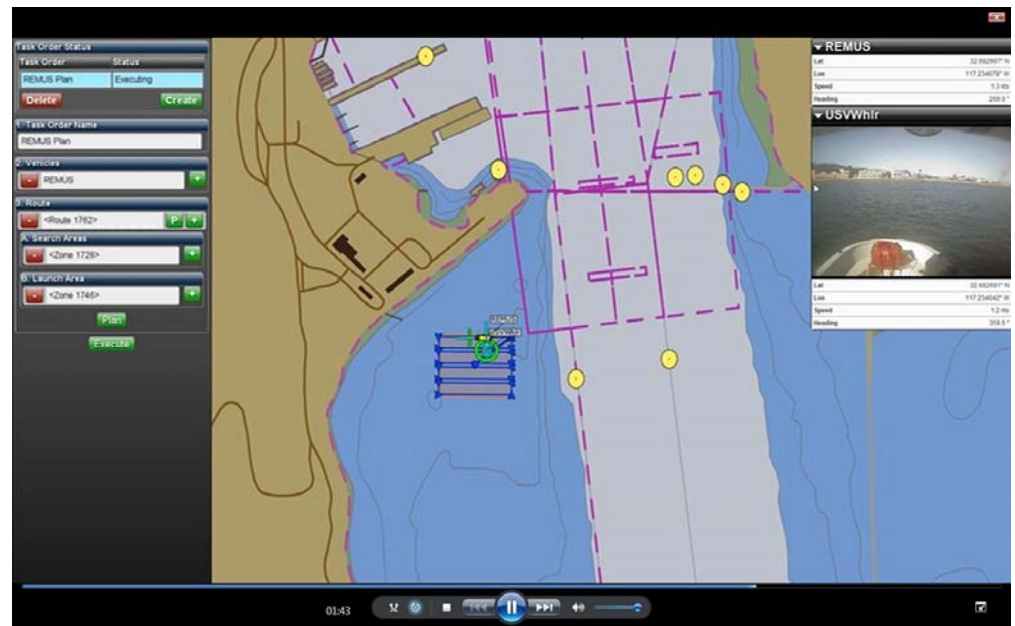
▼ Project updates (from last 6 months):

- Multi-robot Operator Control Unit (MOCU): UUV integration
- MOCU Human-Systems Interface (HSI)
- Autonomous Capabilities Suite (ACS): EOD applications
- Manually-Deployed Communication Relays
- Tunnel Exploration UGV
- Maritime Interdiction Operations UGV



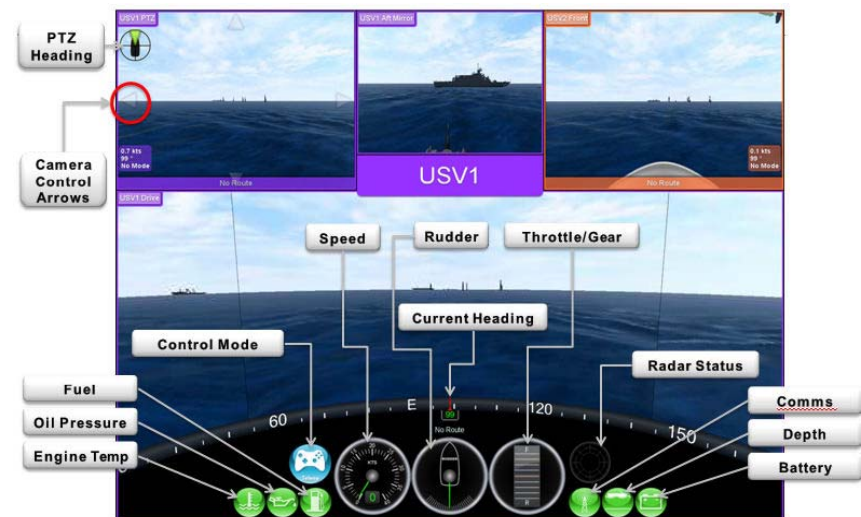
MOCU UUV Demonstration

- ▼ Funded by internal Naval Innovation Science and Engineering (aka Section 219)
- ▼ Scenario: Mine-hunting USVs deploying UUVs
- ▼ Composable ForceNet provided top-level C2
- ▼ MOCU provides low-level C2 of:
 - Remus UUV
 - Seadoo 2000 USV
 - Boston Whaler USV
- ▼ Way-point navigation (UUV performing lawn-mower mine-hunting pattern)



MOCU Human-System Interface (HSI)

- ▼ A Future Naval Capability project with transition agreement with PMS-420 for use aboard the Littoral Combat Ship (LCS) USVs
- ▼ Improves way-point navigation for current LCS USVs
- ▼ Concentrates on “muscle memory” using X-box controller
- ▼ Allows operators to navigate through simulated crowded harbors with significantly reduced stress (21% collision rate vs. 67% prev.)



ACS EOD Applications

- ▼ Funded by JIEDDO to improve operation of EOD robots
- ▼ Same autonomy boxes for both PackBot and Talon
- ▼ Autonomous Capability Suite (ACS) software on both
- ▼ Implemented Extended Kalman Filter using IMU, GPS, rate gyro
- ▼ Uses 2D ladar for obstacle avoidance when available





ACS EOD Applications (cont.)

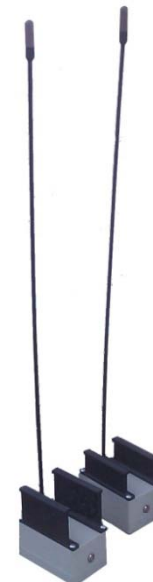
▼ Demonstrations:

- Basic retro-traverse (with or w/o route optimization)
- Retro-traverse upon loss of communications
- Retro-traverse to rally point
- Retro-traverse to actively moving OCU
- Waypoint navigation
- Tele-operation in reverse
- Human-robot leader-follower or robot-robot leader-follower
- Talon remote re-start
- Ahura chemical detection
- Plug-and-play detection of laser/Ahura/Mk I/Mk II
- Simple installation/field servicing
- Control PackBot from Talon OCU (running MOCU) with PackBot radio

- ▼ User demonstrations during week of March 28 at NAVEODTECHDIV, followed by in-theater testing
- ▼ Part of MTRS Improvement Program
- ▼ To be incorporated into AEODRS (part of the Autonomous Behavior Module)

Manually-Deployed Relay Nodes

- ▼ Response to JUONS CC-0412
 - Extend range between robot and OCU
 - Allows non-line-of-sight operations
- ▼ Off-shoot of AMCR/ADCR/APDS
- ▼ CREW test at China Lake 9/2010
- ▼ Targeting:
 - PackBot 500 EOD (MTRS Mk 1 Mod 0)
 - PackBot 510 (MTRS Mk 1 Mod 1, FasTac)
 - PackBot 310 (SUGV, MiniEOD)
- ▼ 10 systems to be delivered in July for CONUS and in-theater testing



Tunnel Exploration UGV

▼ Objectives:

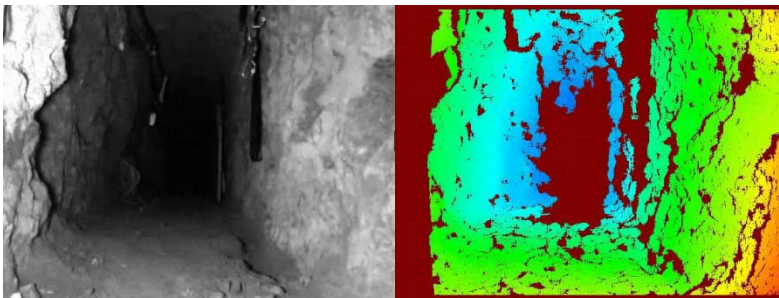
- Can be inserted and retrieved through 8" borehole
- Can travel 400m and localize with less than 1m error

▼ Joint AFRL/SPAWAR effort (2010-2014):

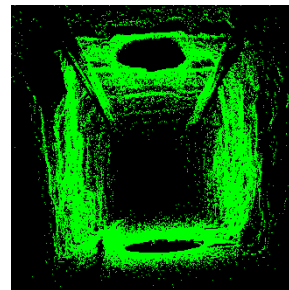
- AFRL: UGV, borehole insertion apparatus
- SPAWAR: Localization, mapping, characterization
- Localization: real-time 3D SLAM (2011-2012)
- Characterization: 3D modeling (post processing)



GDRS



JPL



CMU



SARCOS

Maritime Interdiction Operations UGV

▼ Goals:

- Identify desired features and specifications for MIO UGVs
- Develop prototype meeting those specifications

▼ Market survey completed. Six systems lined up for Navy/USMC VBSS evaluations:

- Span spectrum of size, weight, functionality
- ODF Eyeball, MacroUSA Armadillo, Recon Scout, Omnitech Toughbot, Prototype A, Prototype B (to be unveiled at NDIA GRCC)

▼ RFP for follow-on 9-month development effort to be issued in April/May



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QUESTIONS?